SUPERFUND
PROPOSED PLAN FACT SHEET
ILLINOIS CENTRAL JOHNSTON YARD SITE
MEMPHIS, TENNESSEE
AUGUST 2010

DATES TO REMEMBER
(mark your calendar)

PUBLIC COMMENT PERIOD:
August 25 –September 23, 2010
U.S. EPA will accept written comments on this Proposed Plan during the public comment period.

PUBLIC MEETING:
August 31, 2010 at 6:30 pm
U.S. EPA will hold a public meeting to explain this Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at:

Mitchell Road Community Center
602 Mitchell Road
Memphis TN 38109
901/789-2927

For more information regarding the Site, see the Administrative Record at the following locations:

U.S. EPA Records Center	Memphis Shelby County Public Library
61 Forsyth Street, S.W.	3676 South 3rd Street
Atlanta, GA 30303	Memphis, TN
(404)562-8946	(901) 789-3140
Hours: M-F	Hours: Mon-Tues
8:30am-4:30pm	10am-6pm
	Weds, Thurs, Sat
	10am-5:00pm

INTRODUCTION

This Proposed Plan identifies the Preferred Alternative for dealing with soil and groundwater impacted by diesel fuel near the center of the Illinois Central Johnston Yard Site (Site). This Proposed Plan also provides the reasons for this preferred alternative. In addition, this Proposed Plan includes summaries of other cleanup alternatives evaluated for this Site. This document is issued by the U.S. Environmental Protection Agency (EPA), the lead agency for site activities, and the Tennessee Department of Environment and Conservation (TDEC), the support agency. EPA, in consultation with TDEC, will select a final remedy for the site after reviewing and considering all information submitted during the 30-day public comment period. The final decision will be documented in a Record of Decision. A Record of Decision is a public document that explains which cleanup alternative will be used at a Superfund site and the reasons for selecting the alternative.

EPA, in consultation with TDEC, may modify the Preferred Alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NCP is based on the requirements of the federal law known as the Comprehensive Environmental Response, Compensation, and Liability Act (commonly referred to as "Superfund").

The Site is not listed on the National Priorities List, but is being addressed in an equivalent manner under the Superfund Alternative approach.

This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation (RI) and Feasibility Study (FS) Reports and other documents contained in the Administrative Record file for this Site.

EPA and TDEC encourage the public to review these documents to gain a more comprehensive understanding of the Site and Superfund activities that have been conducted at the Site.

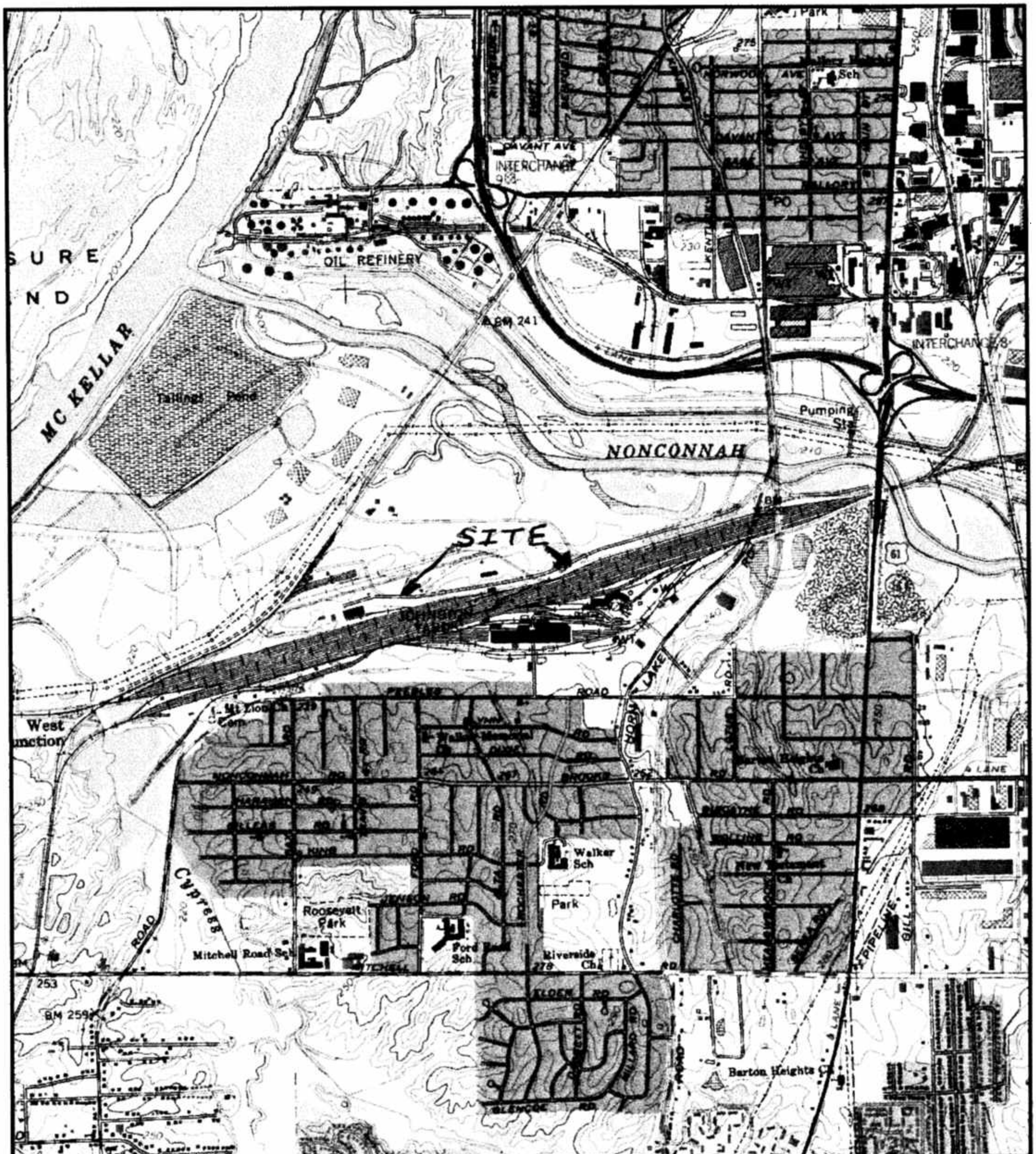
SITE HISTORY

The Illinois Central Johnston Yard Site is an active railyard which has been in operation for almost 100 years. The Site is located in southwest Memphis near W. Peebles Road and New Horn Lake Road (see Figure 1). Site operations include a classification yard, locomotive fueling and servicing center, and a freight car repair facility. An intermodal facility (trains to trucks) was operated on-site until 2006. The intermodal facility has been relocated several miles west of the Site.

The Site is bordered to the south by a residential neighborhood, to the east and northwest by light industry, and to the west and north by undeveloped parcels of land. Nonconnah Creek is about 300 yards north of the northern boundary of the Site.

As a fueling and servicing center, the railyard maintains a 500,000-gallon diesel fuel oil (DFO) aboveground storage tank (AST), a clean lubrication oil system, and a used oil collection system. Prior to 1993, diesel fuel oil was supplied to the railyard by an underground/aboveground pipeline. Diesel fuel oil is now delivered to the railyard by tanker truck and off-loaded at a concrete-lined fuel delivery pad. Fuel is then transferred to the 500,000-gallon AST. A concrete fueling apron collects any spilled fuel oil and wastewater and transfers it to the wastewater treatment system.

The maintenance area includes several large buildings used for locomotive repair and equipment maintenance. Oil and used oil are stored inside secondary containment in nearby buildings.



SITE LOCATION

ICRR JOHNSTON YARD
MEMPHIS, TENNESSEE

PROJECT NO.	158921	DATE: AUGUST 2008

FIGURE 1

SOURCE:
U.S.G.S. 7.5 MINUTE QUADRANGLE MAP(S),
SOUTHWEST MEMPHIS, TENNESSEE-ARKANSAS 1965; PHOTOREVISED 1993

Used oil is typically transferred offsite by truck. Prior to 2005, wastewater containing used oil, which was generated during maintenance activities, was collected in the maintenance area and routed to two clay-lined wastewater treatment lagoons at the eastern end of the maintenance area. Oil was separated from the water. The used oil was then stored until picked up by a local recycling company. The treated water was then discharged to the City of Memphis municipal sewer system according to a pretreatment agreement. At the beginning of 2005, the lagoon system was decommissioned and replaced with a state-of-the-art wastewater treatment system, which includes aboveground wastewater holding tanks and a dissolved air floatation system. Recycling of oil and the discharge of treated water to the municipal sewer system continues according to permit requirements.

Nine other above ground or underground storage tanks (ranging in size from 300 gallons to 17,000 gallons) have been removed from the Site during facility upgrades.

Additional facility upgrades have included the construction of a new locomotive repair center and the regrading of some soil and reconfiguration of some track lines in the classification yards along the center of the Site. Lead contaminated soil was removed from a portion of the footprint of the new locomotive repair center in 2007.

Several areas of on-site soil were used as fill material for railyard construction activities. Also, some areas of the classification yards were regraded and tracks reconfigured during 2008 as part of the yard's ongoing operations. The soils were tested prior to the construction activities.

EPA conducted some initial community interviews at the start of the studies and mailed fact sheets to the community in April 2005, February 2007, and the Proposed Plan in August 2010.

Site Characteristics

The Site, which covers about 288 acres, is about two miles long. It is wider in the middle and narrows at both ends as the main rail lines enter and exit the property. As noted previously, the facility has included fueling and servicing functions for decades.

The topography of the area is moderately to gently rolling with elevations ranging from 240 feet to 310 feet above mean sea level (msl). Water bodies near the Site include Nonconnah Creek, Riverport Harbor, Lake McKellar, and Cypress Creek. Additionally, three smaller drainages, the Northwest Drainage Ditch, the Double 36-inch Outfall Drainage Ditch, and the Eastern Drainage Ditch, carry surface water flow at the Site northward towards Nonconnah Creek. Nonconnah Creek flows westward before emptying into Lake McKellar. Undeveloped woodlands border the Site to the north and separate the Site from Nonconnah Creek.

The surficial geology beneath the railyard is fill material composed of pebble-size, angular, crushed crystalline igneous rock and limestone ballast in a layer about three feet thick. The fill overlies both creek alluvium and the silts and clayey silts that cover the uplands south of the Site.

In the western and central portion of the Site, the railyard is situated upon re-worked silty clay that has been graded to accommodate the layout of the railyard. However, in the eastern half of the Site, the railyard layout encroached upon the historic floodplain of Nonconnah Creek. In this area roughly east and north of the former Roundhouse, the natural ground surface has been raised several feet with fill material. This has resulted in the formation of a shallow perched groundwater system, which overlies the natural ground surface. The Shallow Perched Zone is present in the east central portion of the Site and is confined to that area directly beneath the railyard.

Groundwater in the Shallow Perched Zone flows to the east-northeast. Beneath the fill material, silty clay forms the upper aquitard of the "Fluvial Aquifer." The silty clay is between 20 and 45 feet thick beneath the railyard decreasing to approximately 16 feet in the vicinity of Nonconnah Creek.

Beneath the silty clay, lies the surficial or Fluvial Aquifer. The thickness of the fluvial aquifer under the Site varies from about 12 feet to more than 60 feet. Groundwater in the Fluvial Aquifer flows to the north-northwest towards Nonconnah Creek and Lake McKellar under confined conditions.

The Jackson-Upper Claiborne confining unit separates the Fluvial Aquifer from the Memphis Aquifer. There are some identified windows through the Jackson-Upper Claiborne formation which provide hydrologic conduits to the Memphis Aquifer. However, the nearest window is below President's Island, approximately 3 miles to the northwest of the Site. A report from the USGS noted that the Jackson-upper Claiborne confining unit is over 100 feet thick beneath the Site. Beneath the Jackson-upper Claiborne confining unit lies the Memphis Sand Formation, which is the principal water bearing zone of the Memphis Aquifer.

The Memphis Sand aquifer supplies approximately 95 percent of the water used in the Memphis area for municipal and industrial purposes. The nearest public water supply well drawing water from the Memphis Sand aquifer is approximately two miles northeast of the Site at the City of Memphis' Allen well field. There are no known private wells within one mile downgradient of the Site.

Remedial Investigation Results

During the RI, samples were collected from surface and subsurface soil, ground water, surface water, and sediment. The sampling strategy considered several factors including the potential for contaminant migration via surface water or groundwater flow, previous studies at the Site, and limitations associated with working around the various track lines at this active railyard. Soil sampling was performed under some tracks prior to the reconfiguration of those tracks. Samples were analyzed for parameters based on expected site related contaminants such as PAHs from petroleum and previous sampling results at the Site. Groundwater samples were also analyzed for volatile organic compounds, particularly from monitoring wells in the fluvial aquifer in the general area of the locomotive roundhouse where extensive maintenance activities occurred.

Soil sampling was performed in several phases including the initial RI fieldwork and subsequent sampling in specific areas where facility construction or reconstruction was planned. These areas included the east end of the existing Car Shop and the classification yards. Subsequent sampling at the east end of the Car Shop area focused on lead in soil, while sampling from the classification yards included analysis for metals, petroleum related compounds, and pesticides.

Groundwater sampling was also performed in different phases including the initial RI fieldwork and subsequent sampling that focused on the presence of PSH in some portions of the fluvial aquifer. Cone penetrometer testing (CPT) coupled with a rapid optical screening tool (ROST) was used to further evaluate the shallow soils and to define the nature and extent of the potential PSH plumes in the Shallow Perched Zone and the Fluvial Aquifer. Additional monitoring wells were then installed based on the CPT results.

The likely sources of petroleum contamination are the former fueling areas where historic spills or leaks of petroleum occurred during decades of fueling operations. The former wastewater lagoons could have been another source. These two lagoons were decommissioned and replaced with aboveground holding tanks and a dissolved air flotation system.

Metals and TPHs (total petroleum hydrocarbons) were detected in surface and subsurface soil samples collected during the site wide RI. The highest levels of arsenic and lead detected in surface soil were 86 ppm and 3400 ppm, respectively. The exposure point concentrations were 18 ppm and 500 ppm respectively. The highest concentrations of TPHs were found in the general area near the former fueling islands and former wastewater lagoons as well as a small area on the northeast side of the former car shop. Individual PAH compounds were detected in soil, including benzo(a)pyrene which had concentrations ranging from 0.0078 ppm to 9.4 ppm.

After the site wide RI field work was completed, there was additional sampling in specific areas associated with ongoing construction at the Site. During 2007, elevated lead levels were found in soil adjacent to the former car shop. Lead levels ranged from 1,249 ppm – 3,449 ppm. Impacted soil in this area was removed for proper offsite disposal so that construction of a new locomotive repair center could proceed.

Another subsequent construction project in 2008 included the reconfiguration of some rail lines and the regrading of the underlying soil primarily in the classification yard, located along the center of the railyard. The soil was tested for certain pesticides, PAHS, and metals. Contaminant levels were generally consistent with the levels found during the initial RI, except that some of the metals were higher in some samples. Arsenic concentrations ranged from approximately 1 ppm to 757 ppm. A majority of arsenic concentrations in surface soil/fill material were below 20 ppm and almost 87% of the concentrations were below 100 ppm. Lead detections ranged from approximately 3 ppm to 11,400 ppm. Almost 94% of the lead concentrations were below 800 ppm.

Metals and total petroleum hydrocarbons (TPH) are found in some monitoring wells in the shallow perched groundwater. The most commonly detected metals were aluminum, manganese, and iron. Arsenic and lead were also detected in some wells. The highest level of arsenic was detected in MW-3. Subsequent re-sampling of that well indicated lower levels of arsenic, but still greater than 0.01 mg/l. In other shallow wells, arsenic was not detected or was just above a level of 0.010 mg/l. Lead was detected in some shallow wells at levels generally below 0.015. One well, MW-10, had a lead concentration of 0.065 mg/l. MW-10 is located just south of the former wastewater lagoons. Diesel has been noted in some wells in the perched zone onsite, including MW-13 and RW-01, both located near the northeast corner of the existing car shop. Diesel has also been noted in piezometers P-1, -2, -3, and -6, located near the former wastewater treatment lagoons.

Metals and TPH are found in some monitoring wells in the fluvial groundwater. Aluminum and manganese were the most commonly detected metals in groundwater, but arsenic and lead were also detected in some wells. Monitoring well GW-02 had initial concentrations of arsenic and lead equal to 0.180 and 0.044 mg/l, respectively. The highest level of arsenic, 0.985 mg/l, was detected in MW-15. Subsequent resampling of wells MW-15 and GW-02 indicated much lower levels of arsenic, but still greater than 0.01 mg/l.

TPH have been detected at levels above 1.0 mg/l in fluvial groundwater wells, particularly in the area near the former fueling island and wastewater lagoons. Free product has been noted in monitoring wells in this area including MW-33, -35, -36, -37, -38, -40, and -42.

TPH have been detected at or below 1.0 mg/l in fluvial monitoring wells MW-01, MW-31, MW-32, and GW-04 which are located in the northwest quadrant of the Site.

Contaminants, primarily PAHs and metals, were detected in sediments collected from the Northwest Drainage Ditch, the Double 36-inch outfall ditch, Cypress Creek, and Nonconnah Creek. Concentrations were higher in the Northwest Drainage Ditch and the Double 36-inch outfall ditch. Only a few samples exceeded the sediment quality benchmarks for metals and PAHs.

Contaminants, primarily metals, were detected in surface water collected from the Northwest Drainage Ditch, the Double 36-inch outfall ditch, Cypress Creek, and Nonconnah Creek. Concentrations tended to be higher in Nonconnah Creek than in the other smaller waterways. However, the contaminants in almost all surface water samples were below or just above their respective water quality benchmarks. In some cases, results for pesticides indicated an exceedance of the benchmarks because the sample quantification limit exceeded the benchmarks. It is worth noting that the results for sediment samples collected in proximity to the surface water samples did not have detected levels of pesticides and the quantification limits were below the sediment benchmarks.

SUMMARY OF SITE RISKS

Risk assessments were conducted to determine the current and future effects of contaminants on human health and the environment. For a further description of the human health risk assessment, see the text box entitled What is Risk and How is it Calculated.

The baseline human health risk assessment estimates the risks posed by the Site if no action was taken. According to the risk assessment, exposure to contaminants at the Site for the scenarios based on continued industrial use (such as the current rail yard operations) does not pose an unacceptable risk to people or the environment. However, weathered diesel and related contaminants are present in groundwater under some portions of the Site. These contaminants exceed relevant groundwater standards, thus providing the basis for remedial action. Lead has been detected in samples of diesel collected from some monitoring wells.

Human Health Risk Assessment

Exposure to contaminants at the Site does not pose an unacceptable risk to people. The risk assessment considered different ways people could be exposed to contaminants. The exposure pathways evaluated include inhalation of dust by construction workers, contact with soil by a

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. To estimate the baseline risk at a Superfund site, EPA undertakes a four-step process:

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risk

In Step 1, EPA looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). A comparison between site-specific concentrations and health-based concentrations helps EPA to determine which contaminants are most likely to pose the greatest threat to human health.

In Step 2, EPA considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, EPA calculates a "reasonable maximum exposure" (RME) scenario, which portrays the highest level of human exposure that could reasonably be expected to occur.

In Step 3, EPA uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. EPA considers two types of risk: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from a Superfund site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, the exposed individual would have an excess cancer risk of one in 10,000 due to site contaminants. This excess risk would be over and above the existing cancer risk for the individual. For non-cancer health effects, EPA calculates a "hazard index." The key concept here is that a "threshold level" (measured usually as a hazard index of less than 1) exists below which non-cancer health effects are not expected.

In Step 4, EPA determines whether site risks are excessive for people at or near the Superfund site. The results of the three previous steps are combined, evaluated and summarized. EPA adds up the potential risks for each receptor.

railroad worker, construction worker, site visitor, and trespasser, contact with shallow perched groundwater by construction workers, and contact with and ingestion of surface water from Cypress Creek. The potential for exposure associated with other drainage pathways were considered, but were not significant.

Based on the exposure scenarios evaluated and the continued industrial use of the Site, the Site does not pose an unacceptable risk to human health or the environment. However, as noted in later sections, contaminants have been detected in groundwater at levels that exceed relevant standards. The groundwater in the fluvial aquifer is considered a potential future source of drinking water so some action is warranted.

These exposure scenarios considered current and anticipated future land use. Railroad operations have been ongoing at the Site for about 100 years. It is likely to remain an active railyard for the foreseeable future.

There are no known private wells within one mile downgradient of the Site. The nearest public water wellfields are approximately two miles downgradient (northeast) of the Site.

Ecological Risk Assessment

The Screening Level Ecological Risk Assessment (ERA) evaluated the potential effects on plants or animals due to ingestion or contact with contaminated soil, sediment and surface water.

Surface soil on almost all the Site has been altered and is covered by asphalt pavement, railroad track or ballast. Vegetation cover is sparse and consists primarily of non-native plants. Due to the highly disturbed nature, significant habitat for ecological receptors is not present in these areas.

According to the ERA, there were no indications of significant ecological risk to terrestrial animals associated with contaminants detected within the surface soils of non-aquatic habitats present in the vicinity of the Site.

The ERA also concluded that potential risks to ecological receptors from Site related contaminants are not significant within the Eastern Drainage Ditch, Northwest Drainage Ditch, Cypress Creek, the Abandoned Channel of Nonconnah Creek, or Nonconnah Creek.

SCOPE AND ROLE OF PROPOSED REMEDY

The proposed remedy is intended to remove diesel fuel and associated contaminants from the subsurface under portions of the Site. The remedy will also include long term monitoring to evaluate the effectiveness of the remedy, the expected natural breakdown of the dissolved contaminants, and to monitor the concentrations of inorganic contaminants. It is anticipated that the proposed action will be the only action necessary for this Site. In addition, EPA will perform a review every five years ("five year review") for the duration of the remedy. If necessary, the remedy will be re-evaluated and modified depending upon the performance of the remedy.

Diesel fuel, as free product, has been measured in some groundwater monitoring wells at the Site. Benzo(a)pyrene is a typical component of diesel and its presence above federal primary drinking water standards is anticipated in those wells where free product was measured. Lead and arsenic have also been detected in groundwater at levels somewhat above federal primary drinking water standards. The groundwater in the fluvial aquifer at the Site is classified by the State of Tennessee as a potential source of drinking water. Thus, a response action is warranted since chemical specific standards that define acceptable risk levels are exceeded and exposure to contaminants above these acceptable levels is possible in the future.

The CERCLA petroleum exclusion, which excludes CERCLA response authority for "petroleum", does not apply at this Site due to the presence of lead in the diesel samples. EPA has previously determined that the petroleum exclusion does not apply in situations where hazardous substances not normally found in petroleum are present. Lead has been detected in samples of diesel fuel collected from some of the monitoring wells at the Site. Lead is not a typical component found in diesel fuel.

This proposed remedy will be protective of human health and the environment. It is the EPA's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in this Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) for this project include:

- Remove the diesel present as free product in the subsurface to the extent practicable
- Stabilize the diesel PSH plume in groundwater to prevent its potential offsite migration
- Address the potential dissolved phase plume in groundwater to comply with ARARs
- Monitor for inorganic contaminants in groundwater

The numeric cleanup goals for groundwater at this site are based on federal primary drinking water standards, Tennessee general water quality criteria, or Tennessee guidance for the management of free product. The goals are listed below:

CONTAMINANT	CLEAN-UP LEVEL
Arsenic	10 µg/L
Lead	5 µg/L
Benzo(a)pyrene	0.2ug/l
PSH	Attempt removal if PSH thickness greater than 0.01 foot in a well.

REMEDIAL ALTERNATIVES

The following Remedial Alternatives were developed and documented in the FS for the Site.

Alternative 1 – No Action

The No Action alternative is included in this FS, as required by the NCP. This alternative provides the baseline for evaluation of other alternatives. No remedial action or additional monitoring is included for the No Action alternative

Alternative 2 - Monitored natural attenuation (MNA) relies on natural processes to achieve the remedial objectives without using active cleanup measures. MNA relies on physical, chemical and biological processes that to reduce the mass, toxicity, mobility, volume or concentration of contaminants in soil and groundwater. These in-situ processes include biodegradation; dispersion; dilution; sorption; volatilization; and chemical or biological stabilization, transformation, or destruction of contaminants.

A significant component of MNA is the monitoring document that MNA is occurring. At first, monitoring would be performed semi-annually for two years. The monitoring would then be reduced to annual sampling. Illinois Central Railroad (ICRR) will seek to optimize the monitoring program throughout the life of the project based on a continuing evaluation of monitoring results. Additionally, ICRR may establish institutional controls at the site, such as deed restrictions, that will limit future Site land use to industrial/commercial uses and limit the installation and use of water supply wells at the Site.

Alternative 3A/3B– Alternatives 3A and 3B both use active skimmers that preferentially pump PSH from groundwater wells located within the plume. The proposed network includes two skimmers installed in monitoring wells MW-07 and MW-13. No configuration was designed for the PSH plume observed in the ¾-inch piezometers north of the former wastewater treatment lagoons, as it is unclear as to whether PSH is generally present in the Shallow Perched Zone in this area. Three 2-inch monitoring wells would be installed in the Shallow Perched Zone in the area of the former wastewater treatment lagoons in order to evaluate the potential presence of PSH. If PSH is confirmed in the Shallow Perched Zone, the wells would be incorporated into the selected alternative.

The proposed network also includes six skimmers installed in deeper monitoring wells MW-33, MW-35, MW-36, MW-38, MW-40, and MW-42. Currently, ICRR has active skimmers installed and operating in monitoring wells MW-33 and MW-36. Additionally, the network of 2-inch monitoring wells in the Fluvial Aquifer could be supplemented by the installation of 4-inch recovery wells.

Alternative 3B considers that after the PSH is removed to the maximum extent practicable, enhanced bioremediation will be conducted in areas appropriate for the application of oxygen-releasing compounds (ORC) to complete the remedial action. The total product volume of the three PSH plumes is calculated at approximately 14,000 gallons. It is impossible to know to what extent the PSH is recoverable; however for the purpose of evaluating the various alternatives, the total recoverable PSH is assumed to be 50% of the in-place volume. As a result, the volume of recoverable PSH is approximately 7,000 gallons. It should be noted that this volume is only an estimate and does not constitute a remedial goal. ICRR will continuously monitor the thickness of the PSH throughout the remedial action and will adjust the volumetric estimates as needed.

Alternative 3A: The following tasks are anticipated to be performed for the following durations:

- PSH recovery with eight skimmers for approximately 5 years

- MNA monitoring – 20 years (2 years of semi-annual sampling and 18 years of annual sampling). The first five years of monitoring will coincide with PSH recovery.

Alternative 3B: The following tasks are anticipated to be performed for the following durations:

- PSH recovery with eight skimmers for approximately 5 years

- Enhanced Bioremediation – 10 years

- MNA monitoring – 15 years (2 years of semi-annual sampling and 13 years of annual sampling). The first five years of monitoring will coincide with PSH recovery, while the remaining 10 years of monitoring will coincide with enhanced bioremediation, if necessary.

Alternative 4A/4B – Alternatives 4A and 4B are the same as Alternative 3A and 3B with the exception that a low vacuum is applied to each well such that the suction enhances recovery of PSH. The vacuum applied to the well is not only effective in increasing the free-phase PSH removal, but the induced flow of air through the subsurface results in hydrocarbons being volatilized and transported through the vadose zone by the flowing air to the recovery well. Additionally, air movement through the soil will help maintain aerobic conditions enhancing microbial activity. However, the hydrogeologic conditions at the Site would require significant manual adjustment of the system, which would reduce the system's effectiveness.

Alternative 4B considers that after the PSH is removed to the maximum extent practicable, enhanced bioremediation will be conducted if necessary to comply with ARARs and complete the remedial action. A likely technique would be to use oxygen-release compounds (ORC) in the former recovery wells. The ORC would be placed in "socks" that would be placed in the wells and replaced annually.

The estimated time for removal of the PSH is three years based upon a removal rate of 10 gallons of PSH per day from the monitoring/recovery wells. Alternative 4B includes enhanced remediation after the PSH is recovered to the maximum extent practicable and reduces the overall timeframe by two years. As noted previously, the three year timeframe is based upon recovery of about 7,000 gallons of PSH. This volume is not a remedial goal but serves to fairly evaluate the performance of each alternative.

The system performance will be reviewed in order to optimize the remedial actions throughout the life of the project. Institutional controls, such as deed restrictions, may also be established at the site to limit future Site land use to industrial/commercial uses and to limit the installation of water supply wells at the Site.

The following tasks are anticipated to be performed for the following durations under Alternative 4A:

- Vacuum-enhanced PSH recovery with eight skimmers – 3 years
- Performance monitoring – 15 years (2 years of semi-annual sampling and 13 years of annual sampling). The first three years of monitoring will coincide with vacuum-enhanced skimming.

The following tasks are anticipated to be performed for the following durations under Alternative 4B:

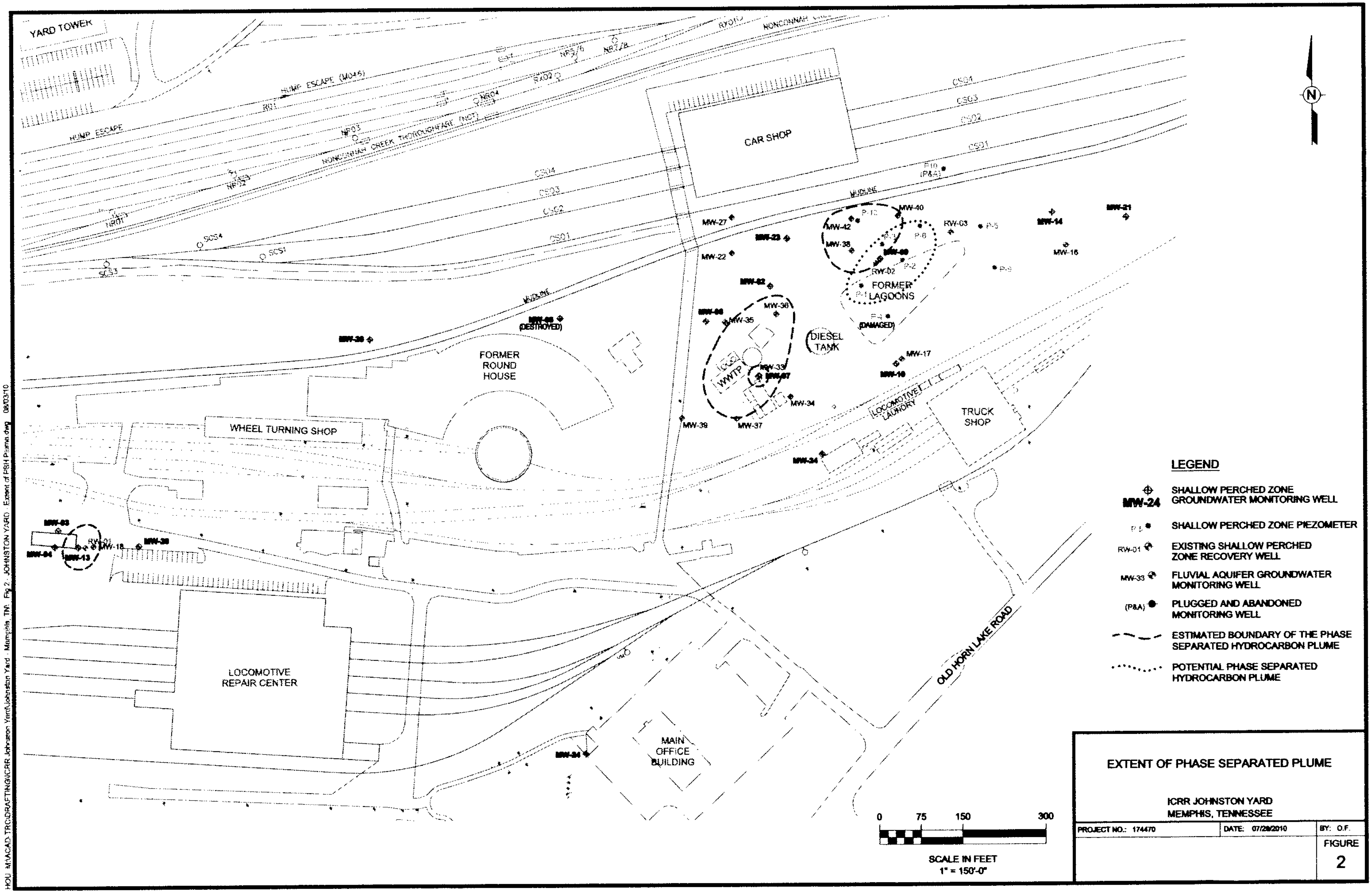
- Vacuum-Enhanced PSH recovery with eight skimmers – 3 years
- Enhanced Bioremediation – 10 years
- Performance monitoring – 13 years (2 years of semi-annual sampling and 11 years of annual sampling). The first three years of monitoring will coincide with vacuum-enhanced skimming, while the remaining 10 years coincides with enhanced bioremediation, if necessary.

Alternatives 5A and 5B consider the use of multi-phase extraction, and more specifically, mobile-enhanced multi-phase extraction (MEME) to preferentially pump PSH from groundwater wells located within the plumes. The MEME technology utilizes high vacuum pumps mounted to tank trucks that allow the recovery of PSH from wells without the capital cost associated with the construction of a permanent recovery system.

The MEME technology has been tested at the Site during several events between 2008-2009. Almost 1400 gallons of PSH were recovered during these tests. The estimated use of the MEME technology includes its use on wells MW-13, RW-01, and MW-07 in the shallow perched zone. The MEME technology would be used on wells MW-33, MW-35, MW-36, MW-38, MW-40, and MW-42 in the deeper Fluvial aquifer. The system would remove the PSH to the maximum extent practicable. The MEME technology can easily be applied to other wells in either shallow perched zone or the fluvial aquifer as needed. See Figure 2 for the locations where the MEME technology would be applied.

The system performance will be reviewed in order to optimize the remedial actions throughout the life of the project. Institutional controls, such as deed restrictions, may also be established at the site, to limit future Site land use to industrial/commercial uses and limit the installation and use of water supply wells at the Site.

The estimated time for removal of the PSH is two years based upon a removal rate of 600 gallons of PSH per series of mobile-enhanced multi-phase extraction events which will be conducted bimonthly during the first two years. Alternative 5B includes enhanced remediation after the PSH is recovered to the maximum extent practicable and reduces the overall timeframe by three years.


YARD TOWER
HUMP ESCAPE
HUMP ESCAPE (M046)
NONCONNAH CREEK THOROUGHFARE (NOT)
CAR SHOP
CS04
CS03
CS02
CS01
MUDLINE
P-10 (P&A)
MW-27
MW-22
MW-23
MW-40
MW-42
MW-38
RW-02
RW-03
P-5
P-6
P-2
P-9
P-1
P-4 (DAMAGED)
FORMER LAGOONS
MW-14
MW-16
MW-21
MW-36
MW-35
MW-33
MW-34
MW-37
MW-39
MW-17
DIESEL TANK
WWTP
LOCOMOTIVE LAUNDRY
TRUCK SHOP
FORMER ROUND HOUSE
(DESTROYED)
WHEEL TURNING SHOP
LOCOMOTIVE REPAIR CENTER
MAIN OFFICE BUILDING
OLD HORN LAKE ROAD
MW-13
MW-18
LEGEND
MW-24 SHALLOW PERCHED ZONE GROUNDWATER MONITORING WELL
P-5 SHALLOW PERCHED ZONE PIEZOMETER
RW-01 EXISTING SHALLOW PERCHED ZONE RECOVERY WELL
MW-33 FLUVIAL AQUIFER GROUNDWATER MONITORING WELL
(P&A) PLUGGED AND ABANDONED MONITORING WELL
ESTIMATED BOUNDARY OF THE PHASE SEPARATED HYDROCARBON PLUME
POTENTIAL PHASE SEPARATED HYDROCARBON PLUME
0 75 150 300
SCALE IN FEET
1" = 150'-0"
EXTENT OF PHASE SEPARATED PLUME
ICRR JOHNSTON YARD
MEMPHIS, TENNESSEE
PROJECT NO.: 174470
DATE: 07/28/2010
BY: O.F.
FIGURE
2
HOU M:\ACAD TRC\DRAFTING\ICRR Johnston Yard\Johnston Yard - Memphis, TN - Fig 2 - JOHNSTON YARD - Extent of PSH Plume.dwg 08/03/10

The following tasks are anticipated to be performed for the following durations under Alternative 5A:

- Mobile-Enhanced Multi-Phase Extraction – 12 events completed over 2 years
- Performance monitoring – 15 years (2 years of semi-annual sampling and 13 years of annual sampling). The first two years of monitoring will coincide with mobile-enhanced multi-phase extraction.

The following tasks are anticipated to be performed for the following durations under Alternative 5B:

- Mobile-Enhanced Multi-Phase Extraction – 12 events completed over 2 years
- Enhanced Bioremediation – 10 years
- Performance monitoring – 12 years (2 years of semi-annual sampling and 10 years of annual sampling). The first two years of monitoring will coincide with mobile-enhanced multi-phase extraction, while the remaining 10 years coincides with enhanced bioremediation, if necessary.

COMPARATIVE ANALYSIS OF ALTERNATIVES

The alternatives were compared to one another using various criteria and guidelines. The comparative analysis considered potential positive, negative, or neutral aspects of the various alternatives. EPA also considers factors or principles specifically for sediment sites such as this project. Consideration of these principles is generally contained within the following discussion of the required nine criteria for Superfund projects. The FS also provides greater detail about the evaluation process.

The required nine evaluation criteria are discussed in the following section.

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall Protectiveness of Human Health and the Environment
Compliance with ARARs
Long-term Effectiveness and Permanence
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment
Short-term Effectiveness
Implementability
Cost
Agency Acceptance
Community Acceptance

Overall Protection of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

The "no action" alternative (Alternative 1) may not be protective of human health or the environment under the current or future-use scenarios. Although the HHRA determined that there is no current risk posed by the groundwater beneath the Site, the discovery of PSH in monitoring wells completed in the Shallow Perched Zone and the Fluvial Aquifer requires that the PSH is recovered to the maximum extent practicable.

The MNA alternative (Alternative 2) may not be protective of human health or the environment because there is no action to remove PSH. Although, the HHRA determined that there is no current risk posed by the groundwater beneath the Site, the discovery of PSH in monitoring wells completed in the Shallow Perched Zone and the Fluvial Aquifer requires that the risk be re-evaluated after PSH is recovered to the maximum extent practicable. Similar to the no action alternative, if the plume moves down-gradient, the MNA alternative has no treatment or removal option.

Alternative 3A provides conditional protection of human health and the environment by removing the PSH, but does not address the potential dissolved-phase plume, which may remain. Alternative 3B provides protection of human health and the environment by the removal of PSH and the enhanced bioremediation may address any remaining dissolved-phase plumes. The MNA evaluation will reveal the effectiveness of the PSH removal.

Alternative 4A provides conditional protection of human health and the environment by removing the PSH, but does not address the potential dissolved-phase plume, which may remain. Alternative 4B provides protection of human health and the environment by the removal of PSH and the enhanced bioremediation may address any remaining dissolved-phase plumes. The long term monitoring will reveal the effectiveness of the PSH removal.

Alternative 5A provides conditional protection of human health and the environment by removing the PSH, but does not address the potential dissolved-phase plume, which may remain. Alternative 5B provides protection of human health and the environment by the removal of PSH and the enhanced bioremediation may address any remaining dissolved-phase plumes. The long term monitoring will reveal the effectiveness of the PSH removal.

Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site. (ARARs = Applicable or Relevant and Appropriate Requirements)

Neither the no action alternative (Alternative 1) nor alternative 2 will comply with ARARs, as the State of Tennessee requires that PSH be recovered to the maximum extent practicable.

Alternative 3A may not guarantee that the dissolved-phase constituents are remediated to concentrations below the chemical-specific ARARs. Alternative 3B should comply with all the ARARs.

Alternative 4A may not guarantee that the dissolved-phase constituents are remediated to concentrations below the chemical-specific ARARs. Alternative 4B should comply with all the ARARs.

Alternative 5A does not guarantee that the dissolved-phase constituents are remediated to concentrations below the chemical-specific ARARs. Alternative 5B should comply with all the ARARs.

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

The potential for contaminant migration in groundwater at the Site is likely to remain the same under the no action alternative. Under this alternative, the Site will be subjected to adverse environmental conditions without the benefit of contaminant treatment, immobilization, containment or disposal. Impacted groundwater and PSH could potentially migrate off the Site.

The potential for contaminant migration in groundwater at the Site is likely to remain the same under alternative 2. Under this alternative, the Site will be subjected to adverse environmental conditions without the benefit of contaminant treatment, immobilization, containment or disposal. Impacted groundwater and PSH could potentially migrate off the Site.

The potential for contaminant migration in groundwater at the Site is reduced under Alternative 3A and 3B. Under the alternatives, the Site will benefit from the removal of the PSH, which will significantly reduce the hydrocarbon that may impact the groundwater. Evaluation of the MNA parameters will determine the robustness of the groundwater system in degrading dissolved-phase hydrocarbons. Enhancing the natural attenuation process using enhanced bioremediation will further shorten the duration of this project, if necessary.

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Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation. Implementation of any of these alternatives presents no short-term risks to nearby residents, as the PSH plume is stable, localized in extent, and contained wholly within the Site boundaries.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

The "no action" alternative includes no treatment component. Any reduction in mobility, toxicity or volume of impacted media will occur through natural processes such as biodegradation, adsorption, attenuation and dilution.

Alternative 2 includes no treatment component. Any reduction in mobility, toxicity or volume of contaminated media will occur through natural processes such as biodegradation, adsorption, attenuation and dilution at a very slow rate. The groundwater data collected will provide information on how well the biological system in the vicinity of the PSH plumes is working.

Both Alternative 3A and 3B remove the source of PSH from the groundwater, reduce the concentration of dissolved-phase constituents, and prevent the PSH from reaching off-site receptors. Alternative 3B includes enhanced bioremediation to accelerate the reduction of dissolved-phase constituents. The MNA evaluation of the groundwater system provides an indication of its ability to degrade hydrocarbon compounds.

Both Alternative 4A and 4B remove the source of PSH from the groundwater, reduce the concentration of dissolved-phase constituents, and prevent the PSH from reaching off-site receptors. The long term monitoring of the groundwater system provides an indication of its ability to degrade hydrocarbon compounds. Alternative 4B includes enhanced bioremediation to accelerate the reduction of dissolved-phase constituents.

Both Alternative 5A and 5B remove the source of PSH from the groundwater, reduce the concentration of dissolved-phase constituents, and prevent the PSH from reaching off-site receptors. Alternative 5B includes enhanced bioremediation to accelerate the reduction of dissolved-phase constituents. The MNA evaluation of the groundwater system provides an indication of its ability to degrade hydrocarbon compounds.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

The "no action" alternative can be implemented immediately. Because no remedial actions are included, no schedule of completion is included. Alternative 2 can be implemented because it includes monitoring and reporting which is easily done.

Alternative 3A can be implemented. The estimated timeframe for removal of the free-phase PSH is five years based upon a removal rate of 5 gallons of PSH per day from 8 monitoring wells collectively. This equates to roughly 3 years and 10 months, but for costing purposes the remedial action is set to occur for five years. The MNA monitoring is described in detail in Section 3, and applies to both Alternative 3A and 3B. Alternative 3B includes enhanced remediation after the PSH is recovered to the maximum extent practicable and reduces the overall timeframe by five years.

Alternative 4A or 4B can be implemented once the additional wells and skimmer systems are installed. However, as mentioned previously, the Site's hydrogeologic conditions (i.e., large fluctuations in the potentiometric surface) would require significant manual adjustment of the system, which would reduce the system's effectiveness. The estimated time for removal of the PSH is three years based upon a removal rate of 10 gallons of PSH per day from 8 monitoring wells collectively. This equates to roughly 1 year and 11 months, but for costing purposes the remedial action is set to occur for three years. Alternative 4B includes enhanced remediation after the PSH is recovered to the maximum extent practicable and reduces the overall timeframe by two years.

Alternative 5 (mobile-enhanced multi-phase extraction) has been tested at the Site. About 1,400 gallons have bèen recovered from the Shallow Perched Zone and the Fluvial Aquifer. The estimated time for removal of the PSH is two years based upon a removal rate of 600 gallons of PSH per series of mobile-enhanced multi-phase extraction events which will be conducted bimonthly during the first two years. Alternative 5B includes enhanced remediation after the PSH is recovered to the maximum extent practicable and reduces the overall timeframe by three years.

Costs includes estimated capital and annual operations and maintenance (O&M) costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

Total capital costs are direct and indirect costs required to perform a remedial action. Direct costs include construction costs or expenditures for equipment, labor, and materials required to implement the remedial action. Indirect costs consist of engineering, permitting, supervising, and other outside services required to implement the remedial action. Certain contingencies have also been included in the cost estimates to account for unknowns, since the FS contains conceptual designs. Performance monitoring and O&M cost estimates were converted to present worth values using a discount rate of 7 percent and a 30-year post-closure period. Therefore, the total present worth of an alternative was the sum of the total capital cost and the present worth of the performance monitoring and O&M costs.

See the following page for table of costs.

State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.
EPA has consulted with TDEC (Tennessee Department of Environment and Conservation) during the RI/FS for this project. State acceptance of the Preferred Alternative will be further evaluated after the public comment period has ended and will be described in the Record of Decision (ROD) for the Site.

Community Acceptance. Community acceptance of the preferred alternative will be evaluated after the public comment period has ended and will be described in the ROD for the Site.

Alternative	Construction or System Operation	Maintenance /Testing/Reporting for 12 to 30 years[1] (present worth)	Total Present Worth Cost
1	0	$213,400	$213,400
2	$30,400	$519,245	$549,645
3a 3b	$90,900 $90,000	$650,091 $602,144	$741,000 $692,144
4a 4b	$161, 000 $161, 000	$490,389 $481,502	$651,400 $642,500
5a 5b	$30,400 $30,400	$584,909 $560,905	$615,300 $591,300
[1]Duration (years) Alternatives 1 and 2: 30; Alternatives 3a: 20, 3b: 15; 4a: 15, 4b: 13, 5a: 15, 5b: 12			

SUMMARY OF THE PREFERRED ALTERNATIVE

EPA's preferred alternative is Alternative 5B which includes Mobile-Enhanced Multi-Phase Extraction, enhanced bioremediation (as necessary) and approximately 12 years of performance monitoring. The railyard will be responsible for the costs and implementation of the remedy with oversight by EPA.

Based on the information available at this time, EPA believes that Alternative 5B provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b), which include that the alternative would be protective of human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions. The Preferred Alternatives can change in response to public comment or new information.

EPA provides information regarding the proposed remedies for the ICRR Johnston Yard Site to the public through Fact Sheets, public meetings, and the Administrative Record file for the site. EPA and the State encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site. Information regarding the public comment period, public meeting and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan.

For further information on the Illinois Central Johnston Yard Site, please contact:

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Glossary of Terms

Administrative Record: Documents and data used in selecting cleanup remedies at NPL sites. The record is placed in the information repository to allow public access.

ARARs: Applicable or Relevant and Appropriate Requirements. Refers to Federal and State requirements a selected remedy must attain which vary from site to site.

Baseline Risk Assessment**:** A qualitative and quantitative evaluation performed in an effort to define the risk posed to human health and the environment by the presence or potential presence and use of specific pollutants.

CERCLA: The Comprehensive Environmental Response, Compensation, and Liability Act, otherwise known as the Superfund Law.

EPA: U.S. Environmental Protection Agency

Information Repository: Data and documents related to ***Superfund*** site placed near a site for the public.

LNAPL: Light Non-Aqueous Phase Liquid. This is another term for PSH or phase separated hydrocarbon. At this site, it refers to the diesel that floats on top of groundwater.

Monitoring: The periodic or continuous surveillance or testing to determine the level of pollutants in various media or in numerous plants and animals.

National Contingency Plan (NCP)**:** The federal regulation that guides determination of sites to be corrected under the Superfund program and the program to prevent or control spills into surface waters or other portions of the environment.

Proposed Plan: A document that presents the preferred remedial alternative for a site to the public. The proposed plan briefly summarizes the alternatives studied in the detailed analysis phase of the RI/FS and highlights the key factors that led to identifying the preferred alternative.

Record of Decision (ROD): A public document that explains which cleanup alternative will be used at an NPL site and the reasons for selecting the alternative.

Remedial Investigation/Feasibility Study (RI/FS): Two distinct but related studies, normally conducted together, intended to define the nature and extent of contamination at a site and to evaluate appropriate, site-specific remedies.

Responsiveness Summary: A summary of oral and written comments received by EPA during a comment period on a Proposed Plan and EPA's responses to those comments. The

Responsiveness Summary is a key part of the ROD, highlighting community concerns for EPA decision-makers.

Superfund: Common name used for the CERCLA and for the Trust Fund which funds the program. The Superfund program was established to oversee the cleanup of hazardous waste sites.

List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental.Response, Compensation and Liability Act
COC	Contaminant of Concern
EPA	United States Environmental Protection Agency
FS	Feasibility Study
NCP	National Oil and Hazardous Substances Contingency Plan
PAHs	Poly Aromatic Hydrocarbons
PRPs	Potentially Responsible Parties
PSH	Phase Separated Hydrocarbons
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
TDEC	Tennessee Department of Environment and Conservation

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on this Proposed Plan for the Illinois Central Johnston Yard Site is important to EPA. Comments provided by the public are valuable in helping EPA select a final cleanup remedy for the site. You may use the space below to write your comments. Comments must be postmarked by September 23, 2010. If you have any questions about the comment period, please contact Randy Bryant at (404) 562-8794 or through EPA's toll-free number at 1-800-435-9233. Those with electronic communications capabilities may submit their comments to EPA via Internet at the following e-mail address: bryant.randy @epa.gov.
Comments may also be mailed to:

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